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(19) (CA) **CANADIAN PATENT** (12)

(54) Corona-Resistant Wire Enamel Compositions and
Conductors Insulated Therewith

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CORONA-RESISTANT WIRE ENAMEL COMPOSITIONS AND
CONDUCTORS INSULATED THEREWITH
ABSTRACT OF THE DISCLOSURE

A corona-resistant wire enamel composition is described comprising a polyimide, polyamide, polyester, polyamideimide, polyesterimide, or polyetherimide resin and from about 1% to about 35% by weight of dispersed alumina particles of a finite size less than about 0.1 micron, the alumina particles being dispersed therein by high shear mixing. A method of providing corona resistant one and two-stage insulations for an electrical conductor employing the above compositions and an electrical conductor insulated with a one or two-stage coating of the wire enamel compositions are also disclosed.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

- 5 1. An electrical conductor coated with a corona-resistant wire enamel comprising a polyimide, polyester-imide or polyamideimide resin or mixtures thereof containing from about 1% to about 35% by weight of alumina particles having a size less than about 0.1 micron, said alumina particles having been dispersed in said resin by high
10 shear mixing.
2. An electrical conductor of claim 1 wherein the alumina particles have a size of from about 0.005 to about 0.05 microns.
3. The electrical conductor of claim 1 wherein
15 the resin is a polyimide.
4. The electrical conductor of claim 1 wherein the resin is a polyesterimide.
5. The electrical conductor of claim 1 wherein the resin is a polyamideimide.
- 20 6. An electrical conductor coated with a corona-resistant wire enamel comprising a polyetherimide resin and containing from approximately 1% to approximately 35% by weight of alumina particles having a size from approximately 0.005 microns to about
25 0.050 microns, said alumina particles being dispersed through said resin by high shear mixing.
7. A method of providing a corona-resistant two stage insulated electrical conductor comprising:
coating said conductor with a composition
30 consisting essentially of a polyimide, polyamide, polyester, polyamideimide, polyesterimide, or polyetherimide resin and curing said resin to form a continuous first layer around said conductor; and
thereafter applying a second coating of a
35 composition consisting essentially of a polyimide, polyamide, polyester, polyamideimide, polyesterimide or polyetherimide resin around said first layer and curing

said resin to form a continuous second layer,

wherein said first layer and said second layer are formed from a different resin and wherein either the first layer resin, the second layer resin, or both contains from approximately 1% to approximately 35% by weight of alumina particles of a size less than approximately 0.1 micron dispersed therein by high shear mixing.

8. The method of claim 7 wherein the alumina particles comprise fumed alumina of particle size from approximately 0.005 microns to approximately 0.050 microns

9. The method of claim 7 wherein the high shear mixing is carried out by high energy mixing or high speed agitation.

10. The method of claim 8 wherein said first layer is formed of a polyester resin.

11. The method of claim 8 or 10 wherein said second layer is formed of a polyamide resin.

12. A corona-resistant wire enamel comprising polyimide, polyamide, polyester, polyesterimide, polyamideimide or polyetherimide resin and containing from approximately 1% to approximately 35% by weight of fumed alumina particles having a finite size less than approximately 0.1 micron, said alumina particles being dispersed through said resin by high shear mixing.

13. The corona-resistant wire enamel of claim 12, wherein the alumina particles have a size from approximately 0.005 microns to 0.050 microns.

14. The corona-resistant wire enamel of claim 12, wherein the resin is a polyimide.

15. The corona-resistant wire enamel of claim 12, wherein the resin is an esterimide.

16. The corona-resistant wire enamel of claim 12, wherein the resin is an etherimide.

17. An electrical conductor insulated with a corona-resistant two-stage insulation system comprising:

a first insulating layer disposed peripherally around said conductor formed of a cured polyester, polyamideimide, or polyesterimide resin; and a second insulating layer disposed peripherally around said first layer formed of a cured polyamide resin, wherein the resins forming said first and second layers are different, and wherein either said first layer or said second layer further comprises from about 1% to about 35% by weight of alumina particles of a finite size of less than approximately 0.1 micron, disposed within said resin by high shear mixing.

18. An electrical conductor as recited in claim 17 wherein the alumina particles comprise fumed alumina of particle size from approximately 0.005 microns to approximately 0.50 microns.

19. An electrical conductor as recited in claim 17 wherein said first insulating layer is polyester.

20. In a curable composition useful as corona-resistant insulation wherein said curable composition comprises a polyimide, polyamide, polyester, polyamideimide, polyesterimide or polyetherimide resin, or mixture thereof; said curable composition including from approximately 1% to approximately 35% by weight of alumina particles having a size less than about 0.1 micron.

21. A composition as in claim 20 wherein the alumina particles have a size of from approximately 0.005 to approximately 0.05 micron.

22. A composition as in claim 20 wherein the alumina particles are fumed alumina.

23. A composition as in claim 20 wherein the alumina particles are present in an amount of from about 1 to about 20 percent by weight.

24. A composition as in claim 20 wherein said curable composition comprises a first curable component comprising a polyimide, polyamide, polyester, polyamideimide, polyesterimide or polyetherimide resin, or mixture thereof and a second curable component

comprising a polyimide, polyamide, polyester, polyamide-imide, polyesterimide or polyetherimide resin, or mixtures thereof, with the proviso that the resins forming said first and second curable components are different.

5 25. A composition as in claim 24 wherein said alumina particles are included in said first curable component.

10 26. A composition as in claim 24 wherein said alumina particles are included in said second curable component.

 27. A composition as in claim 24 wherein said alumina particles are included in both said first curable component and said second curable component.

15 28. A composition as in claim 25 wherein said alumina particles are fumed alumina.

 29. A composition as in claim 26 wherein said alumina particles are fumed alumina.

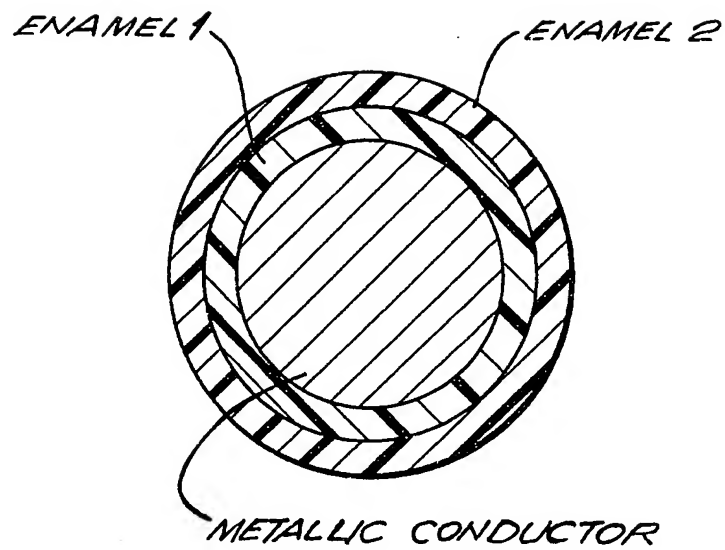
 30. A composition as in claim 27 wherein said alumina particles are fumed alumina.

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